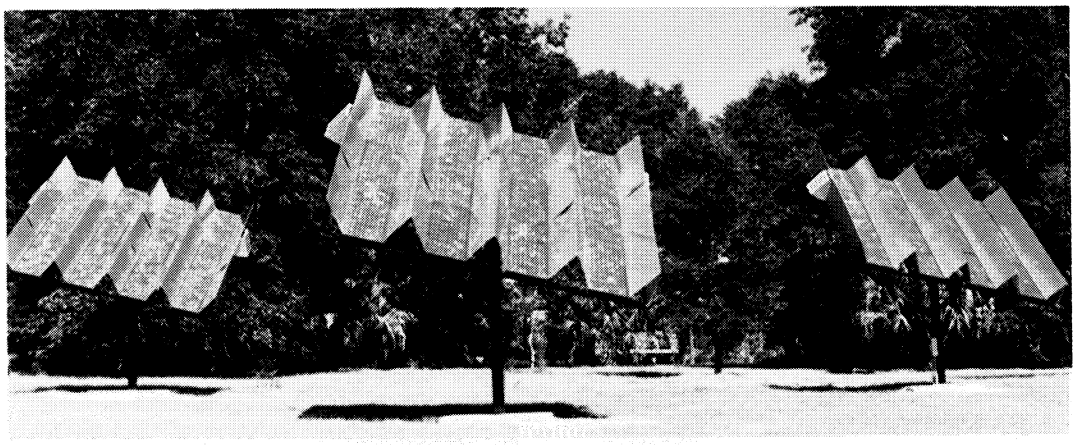
Solar Electric System

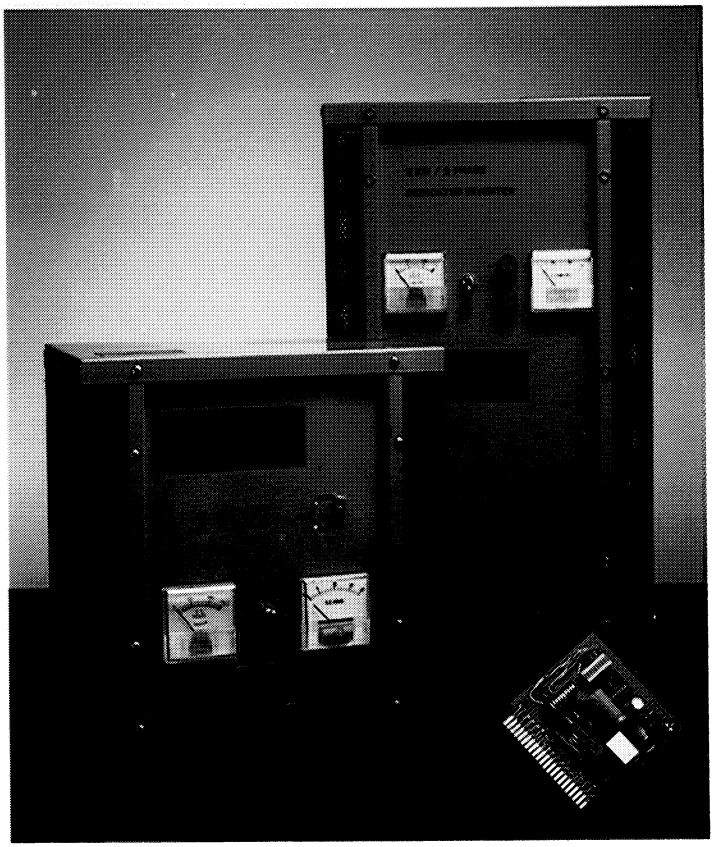


At right are three solar photovoltaic (PV) generators, terrestrial cousins to the PV arrays that have supplied electrical power for the great majority of all U.S. spacecraft. These units are part of an advanced, high efficiency, Sun-tracking PV system designed to provide sufficient electricity for all the normal functions of a home in isolated areas where there are no connecting lines to the utility company's power grid.

Developed by Dinh Company, Inc., Alachua, Florida, the system is operating at a lakeside home in Micanopy, Florida, which is remote from any power grid; the property owner elected to try PV power rather than pay the heavy cost of building a link to the utility's grid. The installation is a test system intended to prove a concept developed by Khanh Dinh, president of Dinh Company, under a technology utilization contract with NASA's Kennedy Space Center (KSC).

Photovoltaic conversion, in which arrays of solar cells convert sunlight directly into electricity, has demonstrated its potential as an alternative energy source in more than a thousand specialized Earth-based applications. Years of research by NASA and the Department of Energy have effected substantial reductions in the cost of PV power, but it is still too expensive for widespread Earth applications, except those where no conventional power source exists—for example, remote automated weather stations, sea-based navigational buoys, forest stations and third world villages.

Khanh Dinh undertook to develop a PV system that could bring solar electricity to the individual home at reasonable cost. His system employs high efficiency PV modules plus a set of polished reflectors that concentrate the solar energy and enhance the output of the modules. Dinh incorporated a Sun-tracking system derived from space tracking technology employed at KSC; it automatically follows the Sun throughout the day and turns the modules so that they get maximum exposure to the solar radiation, further enhancing the system's efficiency.

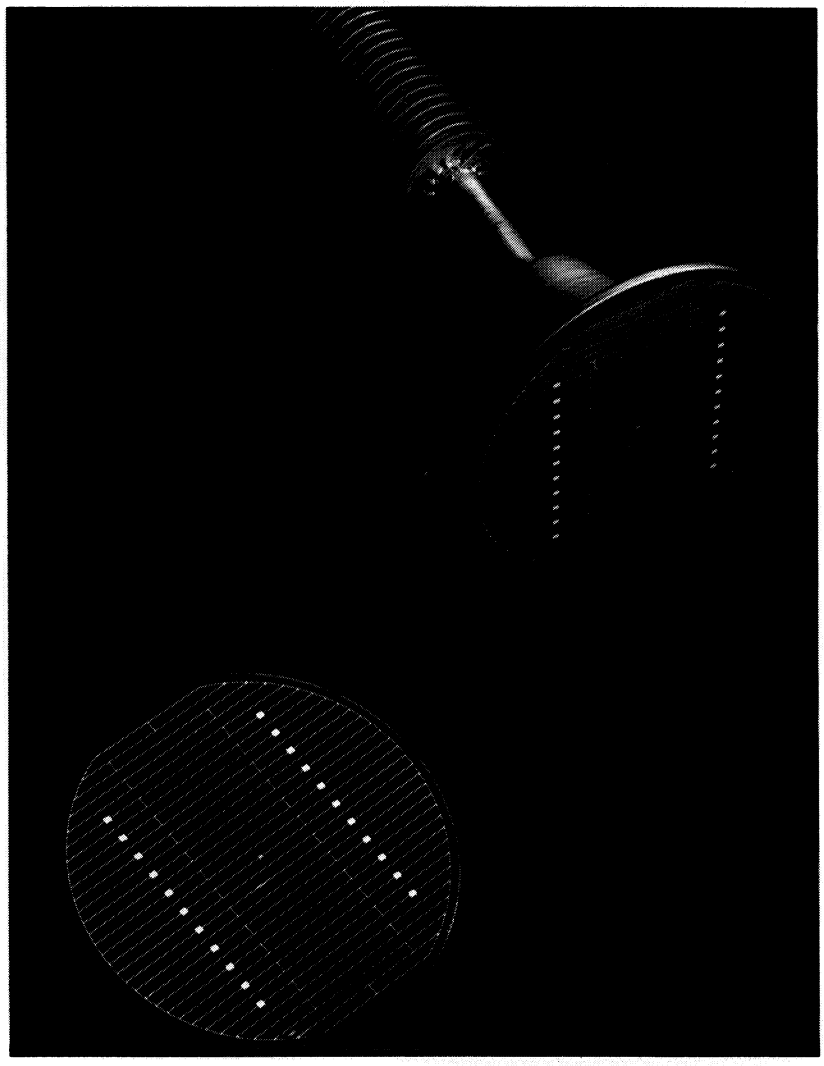


The generator being tested at Micanopy produces an average 20 kilowatthours of electricity daily, an amount sufficient to run a refrigerator, a freezer, a well pump, lights, appliances, TV and partial air conditioning.

Since PV-produced electricity is direct current (DC), it can easily be stored in batteries and used at any time. Some electrical equipment, such as incandescent lamps, can use DC current; other equipment, such as appliances with induction motors, requires use of an inverter to produce AC current from the batteries. Unable to find suitably reliable and efficient inverters in the

commercial marketplace, Dinh developed his own, for which he claims efficiencies of more than 95 percent and very low manufacturing costs. At left below are Dinh-developed inverters of one kilowatt and two kilowatt capacity.

Included in the new inverters is another application of NASA technology: heat pipe technology originally developed as a means of cooling space electronic systems. In the PV generator system, heat pipes cool the power transistors; cooling is necessary to assure proper operation and prevent damage to the inverter. The photo at right shows a power transistor connected to one of the heat pipes; the spiral ribbing of the pipe dissipates heat along the entire length of the pipe and into the atmosphere, providing, according to Dinh, a cooling technique of "unsurpassed efficiency."



The whole PV generator system, says Khanh Dinh, "represents a stand alone power plant that can be installed anywhere in the world at a cost that compares favorably with that of small diesel generators."

In addition to the PV system, Dinh Company is associated with NASA on an application engineering project intended to apply space-developed heat pipe technology to the problem of controlling humidity in buildings located in warm, humid climates. In such areas, moisture removal remains a persistent problem, not only for personal comfort but for proper storage and functioning of costly equipment. A one-time specialist in heat pipe research, Khanh Dinh advanced the idea of a heat pipe-based dehumidifier as a promising, cost-effective approach to the problem. Under contract to KSC, he developed an experimental air conditioner/dehumidifier employing heat pipe technology. The system is undergoing test at several Florida sites. Meanwhile, Dinh has developed a second generation unit for general residential applications; he is shown with the new system at right. ▲